Making and Managing the Magic

"Imagineering" Presents Unique Challenge for Former Air Force Physics Professor Tom McCann

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As a featured speaker at the National Defense Association's Testing and Training Conference in Orlando last summer, Dr. Tom McCann gave the audience a fascinating glimpse into the imaginative and intricate processes of program management, testing and evaluation, and modeling and simulation that help make — and manage — the Disney magic.

You could say that McCann has a program manager's dream job. As Senior Vice President of Engineering, he oversees the engineering divisions within Walt Disney Imagineering (WDI), the master planning, creative development, design, engineering, production, project management and research and development arm of The Walt Disney Company. Headquartered in Glendale, California, WDI is responsible for the creation — from conception through completion — of all Disney Resorts, theme parks and attractions, real estate developments, regional entertainment venues, and new media projects.

That's a far cry from the type of work the 20-year Air Force veteran and former physics professor had been doing until he joined Disney a year ago.

Today, McCann spends his days overseeing system engineering, show ride engineering, design assurance, technical documentation, and technology development programs at WDI. "It's been a real learning experience for me in the little over a year that I've been with Disney," said McCann. "The aerospace experience, of course, is extremely valable and I'm really enjoying this job."

Imagination + Engineering = Imagineering

Working with Imagineers representing more than 150 disciplines — from artists and architects to project estimators and construction managers — McCann's troops are brought on board projects from the very beginning, and the engineering teams are charged with capturing the concepts and turning them into tangible product. And although that may sound like fun to some people, for McCann with his straight-forward, no-nonsense military background, the creative element was a bit, well, foreign to say the least.

"The creative element is something I have never come in contact with before," he readily admitted. "It's sort of like, 'Hey team, give me your requirements. Stop all this arm waving and let's just get the requirements down on paper.' So getting from the creative input part to the requirements on paper part, so that the engineers can understand what it's all about, can be challenging."

From there, the creative collaboration continues throughout the development and construction of the project. And it doesn't end on opening day.

The Life Cycle

The life cycle of a WDI project is generally about five years, according to McCann. During the initial, or "Blue Sky," phase, creative teams of artists, architects, writers, and designers brainstorm story ideas, while Show/Ride engineers consider concepts for ride systems that will support the story.

Once an idea is born in the Blue Sky phase, it moves on to Concept Development. Here's where the "arm waving" stops and the calculators and CAD stations get fired up. Now it's time for the program managers to capture the creativity that was unleashed during the Blue Sky phase and work with the project team to translate it into buildable requirements preparing the project for the various feasibility studies and cost estimates that await. It's also time for the Show/Ride engineers to solidify the concept for the ride system, be it an adrenaline-pumping, 13-story free fall down an elevator shaft as in The Twilight Zone® Tower of Terror at the Disney-MGM Studios, or a whimsical, interactive space adventure such as Buzz Lightyear's Space Ranger Spin at the Magic Kingdom at Walt Disney World.

Once all the studies have been studied, the schedules scheduled, and the estimates estimated, the package is put together for capital authorization and funding.

"And we even get multi-year funding without going back to Congress," McCann says in jest (guess you can take the man out of the military, but...).

Details, Details

Once approved, the project moves on to the Schematics, or design phase. Every detail of the project, including the structural, mechanical, electrical and ride systems, are worked out in a diagrammatic form in preparation for the Construction Documentation phase. Then, with hard hats in hand, it's on to the job site.

Disney engineers are onsite throughout the construction phase ready to answer

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RFIs (Requests for Information), approve shop drawings, and review specifications and materials. And, when all systems are go, the teams conduct weeks of extensive testing to make sure everything is up to Disney standards during the aptly named Test and Adjust phase.

Quality and Quantity

Once an attraction or Park is open, the Imagineers don't just hand over the keys and move on to the next project. WDI's Show Quality Standards (SQS) group includes engineers, designers, and architects who maintain a presence at each Park and work with Operations to ensure the quality of the shows and attractions. Everything from the correct type of light fixture to the exact color of a carpet to the slightest movement of an Audio-Animatronics® figure is documented so that the SQS teams can keep the integrity of the original story intact and ensure that guests will enjoy the same magical experiences that the world has come to expect from Disney.

To that end, the technical performance measures that were used during the actual development of the systems are the same ones used to determine the Show Quality Standards.

Before the job of maintaining the standards of the elements in the Park begins, however, the design and engineering teams must come up with the right products that will meet the demanding life cycle requirements. Disneyland Park, for example has been operating some of the same attractions 365 days a year for 45 years, and it's the engineering teams' job to design and create systems that will meet these seemingly impossible demands. "More and more, WDI is partnering with certain vendors," says McCann, "and we're using their systems, but only after bringing them up to Disney's stringent standards to meet the life cycle requirements."

Teaming with Possibilities

From Blue Sky through opening day and beyond, there is one common thread that ties the entire process together and crosses all occupational borders: teamwork.

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Senior Vice President of Engineering
Walt Disney Imagineering

"It's really about relationship building," says McCann. "It's a lot of teaming and a lot of involvement in the Blue Sky approach between systems engineers and creative people. That's what makes it work. That's what makes the magic."

Partnering with the various disciplines within WDI, the Parks and the outside vendors may sound challenging, but it comes almost naturally to the WDI Engineering group, since the division itself has an integrated team structure thanks to McCann's boss, Gil Decker. Before enlisting with Disney, Decker was the former Assistant Secretary of the Army for Acquisition, Research and Development, so getting fellow veteran McCann to support the integration idea was no problem.

"Gil is big on integrated project teams, as are all of us who come out of that Department of Defense acquisition environment," says Tom. "He instituted the Integrated Project Team way of thinking."

Tools of the Trade

That "way of thinking" is only one tool that the Imagineers rely on to get the job done efficiently as well as effectively. Project controls such as work breakdown structures are implemented to provide measurable quantities, and the company has made a concerted effort to put performance measures in place and use a systematic approach to how they actually measure progress.

"Gate reviews" at each stage of their projects is another innovative method. "We will have gate reviews where we review deliverables," says McCann. "That way, we can iterate back if there are certain things that aren't complete at that particular point in the project. Remember, these are roughly five-year projects for the most part, so tight controls and good management up front yield a big payoff in the long run."

Other factors that McCann sees as aids to the engineering team are the simulation efforts, which are increasing in scope and complexity each year, and the fact that WDI uses all major computing platforms and source software packages. "We use those in all project phases and we now have simulation and modeling data transfer to virtually all of our divisions, plus new in-house tools to help us continue our efforts."

After all," he says, "It's all for the guests, and that means you."

Photo by Collie Johnson